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ABSTRACT

Three interrelated processes; storage, retrieval, and judgment, are distinguished in an attempt to describe stereotype formation. The results of four experiments are described. These experiments were designed to answer some of the questions about what information is learned, how it is stored, how it is retrieved, and, once retrieved, how it is used to form stereotypes about group characteristics. Experiment 1 attempted to show that subjects organize the information they learn about individual group members in different ways, resulting in varying judgments about the characteristics of the group. This result depends in large part on mnemonic organization as it relates to demands on memory. Experiment 2 was designed to see whether subjects would estimate the frequency of individuals with extreme physical attributes to be greater than the frequency of equal numbers of individuals with less extreme physical attributes. Experiment 3 sought to discover whether the same overestimation of extreme instances would occur when using social rather than physical stimuli. Experiment 4 was designed to examine subjects' recall for instances consistent and inconsistent with their original expectancies. (Author/HC)

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Judgmental Heuristics in Stereotype Formation and Maintenance

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When people are presented with information about the attributes of individuals, and are later asked to make judgments about the characteristics of the group comprised of those individuals, it will be necessary to retrieve from memory information about the group members, and attempt to assess the relative predominance of the members' salient characteristics.

Although this statement could pass as a rudimentary cognitive explanation for stereotype formation, it is a deceptively simple description of how subjects make stereotypic judgments, and it evades several important questions. For example, this brief description does not specify what information was originally learned about the group members or how that information was organized in memory; it does not specify how stored information is retrieved, and once retrieved, how it is used to make judgments about the prevalence of the group's characteristics. It may thus be useful, when discussing experientially based stereotype formation, to distinguish among three interrelated processes: storage, retrieval, and judgment.

In this talk, I should like to briefly describe the results of four experiments that address some of the questions evaded by our previous description.

Experiment I

Our first experiment was an attempt to show that subjects may organize the information they learn about individual group members in different ways, and although alternative forms of memory organization are possible, judgments

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UDO 18192

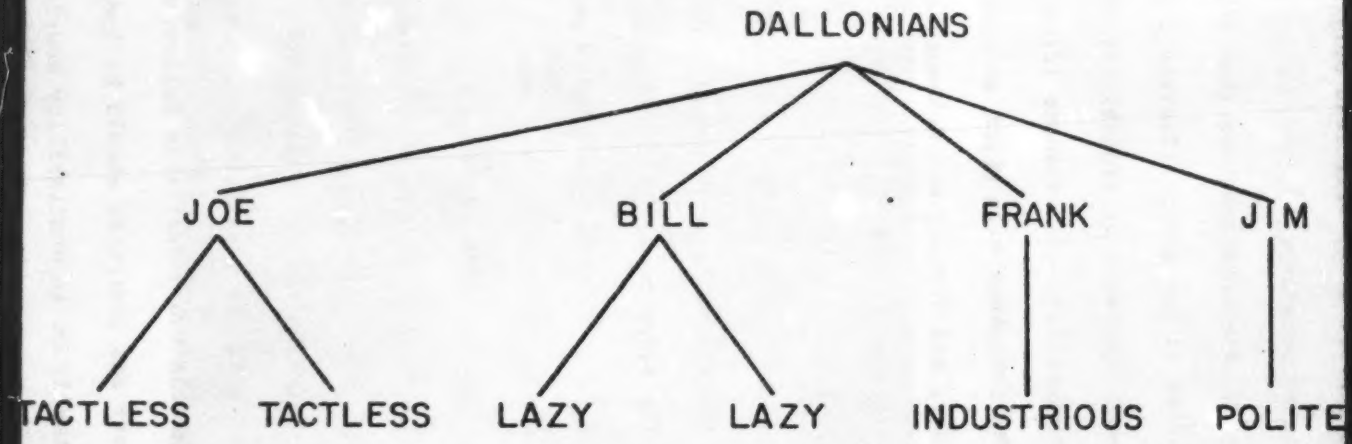
about the characteristics of the group may vary according to the particular form of organization. For example, subjects who have repeated experiences with particular members of a group may organize their perceptions around individual group members or around the group as a whole. To see the implications of these two forms of organization, assume that a subject has contact with four Dallonians--Joe, Bill, Frank, and Jim--each of whom has a different trait. However, suppose Joe and Bill, who are described by negative traits, are observed twice, whereas Frank and Jim, who have positive traits, are observed only once. The two possible types of organization resulting from these experiences are shown in Figure 1.

Insert Figure 1 about here

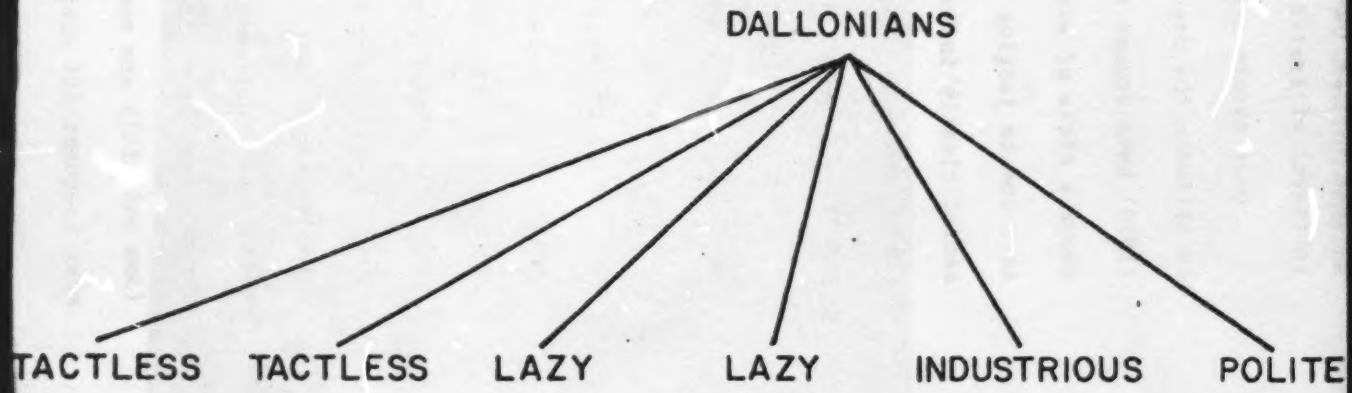
Note that the proportion of individual group members with undesirable traits is .50, whereas the proportion of times an undesirable trait appears (irrespective of who it was paired with) is .67. Thus, if subjects organize this information around the group as a whole, ignoring which person goes with which trait, they subsequently will be unable to differentiate the repeated appearance of a trait in the same individual from the repeated appearance of that same trait in different individuals. Subjects would, in effect, be treating each occurrence of a trait as if it were an independent event and would form a more negative impression of Dallonians than would subjects who organized their perceptions around individual group members, who would be more likely to treat each group member as an independent event.

It is further assumed that when subjects attempt to retrieve this

ORGANIZATION BY INDIVIDUAL GROUP MEMBERS



ORGANIZATION BY GROUP



information from memory, when the information is organized around individuals, subjects will retrieve individual group members with their associated traits, whereas information organized around the entire group will lead only to retrieval of traits (without the associated persons).

Once events are retrieved from memory, subjects must use this information to estimate the predominant characteristics in the group. Tversky and Kahneman (1973) have argued that when subjects make frequency or probability judgments about a class of events, they use the availability of instances (from the class) as a cue to judging class frequency. The frequency with which an item is presented clearly influences its availability, and Tversky and Kahneman argue that subjects assume the reverse is also true--that the availability of an item in memory is taken as an index of its frequency.

For subjects who organize information by individual group members, Joe and Bill (both of whom have undesirable traits) will be more available than Frank and Jim (who possess desirable traits); for subjects who only store the traits, the attributes "tactless" and "lazy" are more available than the attributes "industrious" and "polite". When subjects are then asked to estimate the preponderance of undesirable <u>persons</u> in a group, subjects who organize information around the group can only use the relatively great availability of negative traits to conclude that undesirable persons predominate among Dallonians. However, subjects who organize information around individual group members have knowledge of both the traits and the persons who possess the traits. Thus, even though the two undesirable Dallonians (Joe and Bill) are most available to memory and therefore should be judged most frequent (if subjects are relying heavily on an availability heuristic),

subjects may recall that some group members were presented more frequently than others and may be able to correct for this disproportionate sampling in their judgments about the group. Obviously, to the degree that subjects are able to make this adjustment or correction, they are able to nullify, or at least attenuate, the effects of availability on frequency judgments.

Memory Load and Organization

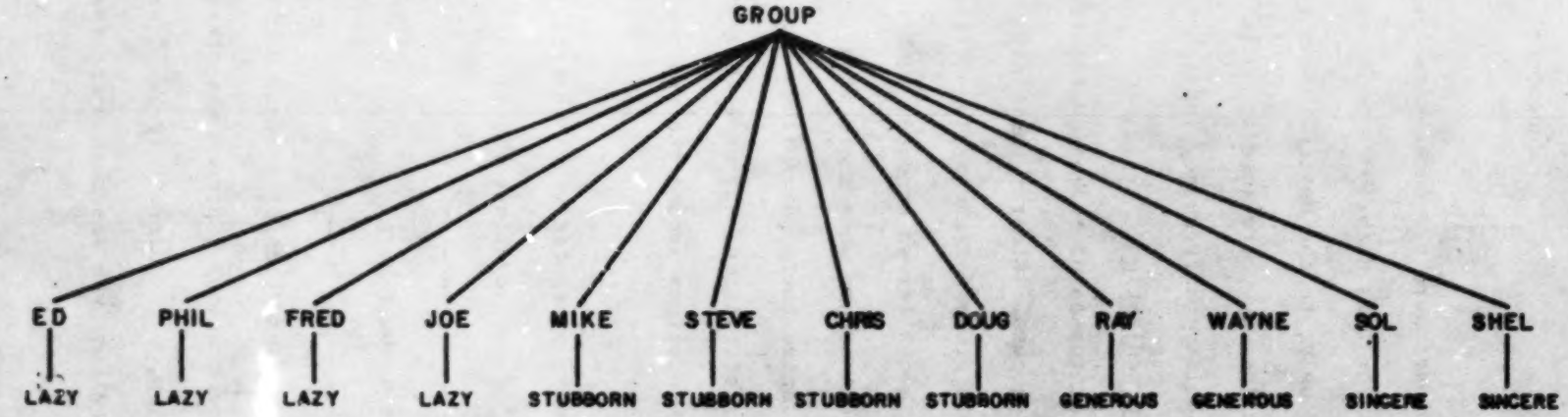
Probably one of the strongest determinants of mnemonic organization is the demands on memory during the learning process. Clearly there are more demands on memory in learning which persons in a group possess a given trait than in learning which traits exist within the group (given an equal number of different traits in both conditions). It is expected that when there is a low demand on memory, subjects will be able to organize their perceptions of a group around its individual members and their attributes, but under high memory load, subjects will tend to organize their perceptions around the group as a whole (ignoring the origins of the traits).

To test our hypothesis, subjects were presented with identical trait information about group members in one of two ways (see Figure 2).

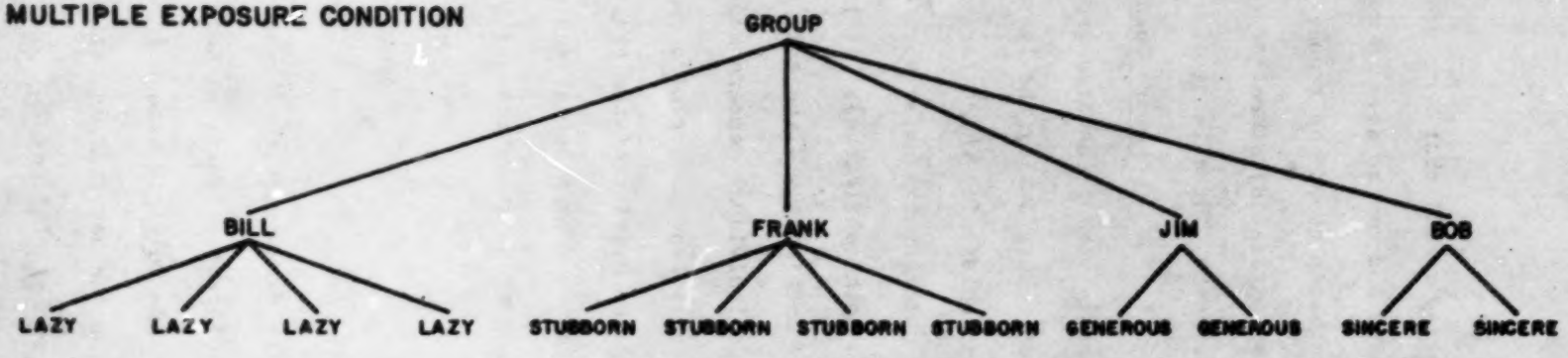
Insert Figure 2 about here

In the single exposure condition, each presentation of a trait was paired with a different stimulus person, and each stimulus person was presented only once. In the multiple exposure condition, a given trait (e.g., "lazy") was paired with one and only one stimulus person, who was then presented a multiple number of times.

SINGLE EXPOSURE CONDITION



MULTIPLE EXPOSURE CONDITION



The relative frequency of presentation of desirable and undesirable traits was also varied, holding constant the number of different desirable and undesirable traits. That is, in all conditions of the experiment, the number of desirable traits was always equal to the number of undesirable traits. However, desirable traits were presented either 1) one-third as often, 2) as often, or 3) three times as often as undesirable traits. For illustration, the example in Figure 2 shows exactly two desirable and two undesirable traits, with the former presented less frequently than the latter.

The extent to which subjects organize their perceptions around individuals or around the entire group could be inferred from their judgments of the proportion of desirable stimulus persons in the group. In the single exposure condition, the proportion of desirable stimulus persons increases monotonically as a function of the relative frequency of presentation of desirable traits; in the multiple exposure condition, however, the proportion of desirable stimulus persons remains constant across the three frequency conditions. Thus, if subjects are organizing their perceptions around group members, their judgments of the proportion of desirable stimulus persons should be independent of the relative frequency of presentation of desirable traits in the multiple exposure condition, but should increase with frequency of presentation in the single exposure condition. However, if subjects are organizing their perceptions around the number of traits (rather than around group members), their judgments of the proportion of desirable stimulus persons should increase with the relative frequency of presentation of desirable traits in a similar fashion under both single and multiple exposure conditions.

Overview of Method. Subjects were presented with either 16 or 64 name-trait configurations of the form "John is creative" with instructions to try to imagine the person being described. The ratio of presentations of desirable and undesirable traits was varied over three levels. Within each level, each presentation of a trait occurred with a different person, with each person presented only once (single exposure condition), or a given trait appeared with one and only one person, with that person presented multiple times (multiple exposure condition). After being presented with the stimulus information, subjects were asked to estimate the proportion of desirable, undesirable, and neutral persons in the group, recall the adjective traits, and rate the attractiveness of the group as a whole. These data were analyzed as a function of memory load (16 vs. 64 presentations), ratio of presentation of desirable and undesirable traits (frequency), and number of times each stimulus person was presented (single or multiple).

Summary of Results and Discussion

The data for the three main measures--frequency estimates, recall, and attractiveness--are depicted graphically in Figure 3. As is apparent from

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Insert Figure 3 about here

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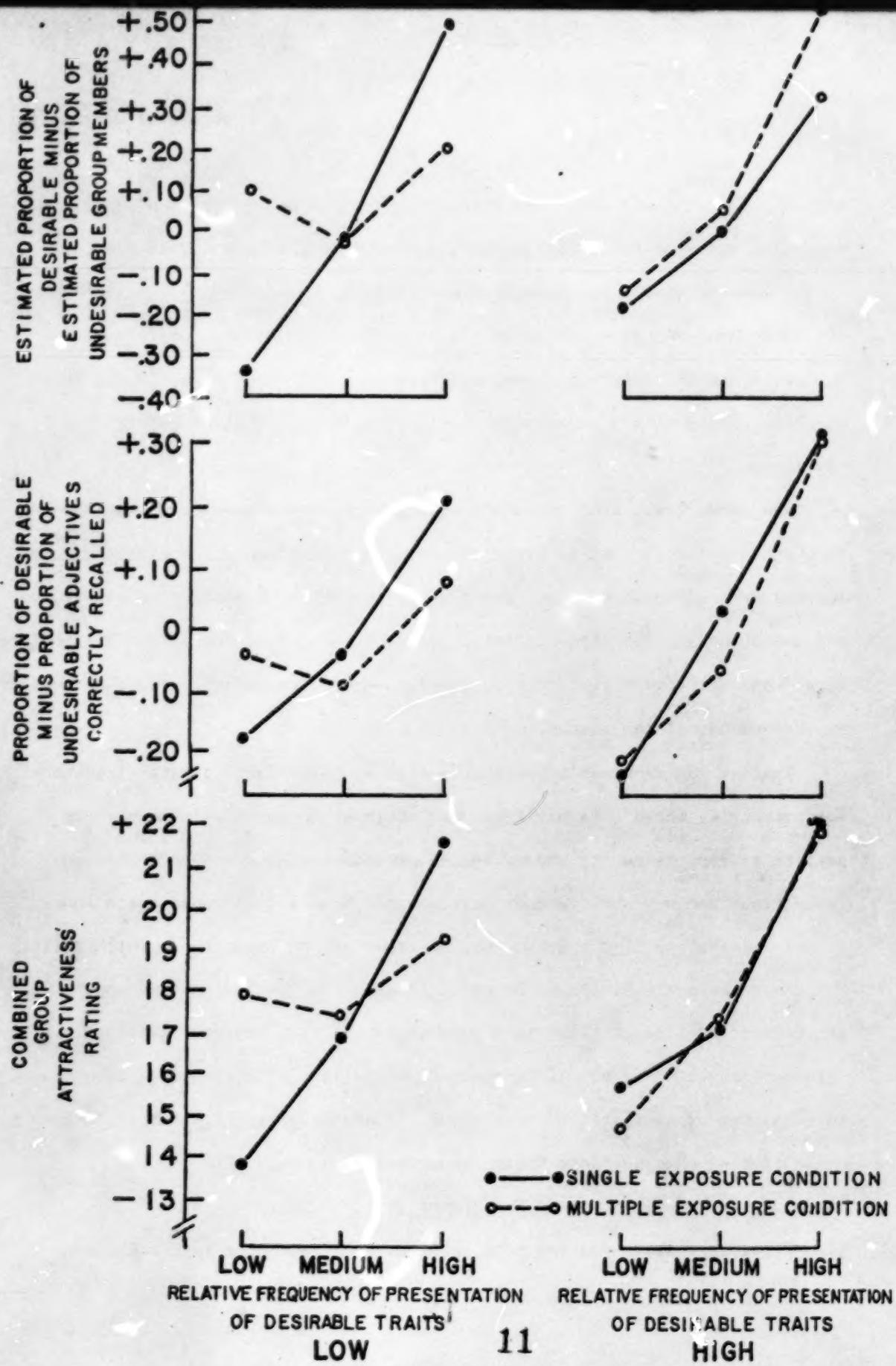
inspection of this figure, all three measures show the form of the predicted three-way interaction: under low memory load, subjects, when exposed to multiple presentations of the same stimulus person, are more likely to treat each stimulus person as independent in forming a group impression (as revealed in different curves for the single and multiple conditions), whereas under high


ESTIMATED PROPORTION OF DESIRABLE MINUS ESTIMATED PROPORTION OF UNDESIRABLE GROUP MEMBERS
+.50
+.40
+.30
+.20
+.10
0
-.10
-.20
-.30
-.40
PROPORTION OF DESIRABLE MINUS PROPORTION OF UNDESIRABLE ADJECTIVES CORRECTLY RECALLED
+.30
+.20
+.10
0
-.10
-.20
COMBINED GROUP ATTRACTIVENESS RATING
+22
21
20
19
18
17
16
15
14
13
SINGLE EXPOSURE CONDITION
MULTIPLE EXPOSURE CONDITION
LOW MEDIUM HIGH
RELATIVE FREQUENCY OF PRESENTATION OF DESIRABLE TRAITS
LOW
LOW MEDIUM HIGH
RELATIVE FREQUENCY OF PRESENTATION OF DESIRABLE TRAITS
HIGH
MEMORY LOAD

memory load, subjects were more likely to treat each occurrence of a multiply presented stimulus person as an independent event (as revealed in similar curves for the single and multiple conditions).

The three-way interaction is statistically significant for frequency estimates and attractiveness measures, but does not reach significance for recall, quite possibly because of a ceiling effect in the low memory load condition.

The data, then, are consistent with the general expectation that the way in which the information is organized in memory influences the overall group impression. Although the data are also consistent with expectations based on the use of an availability heuristic, since frequency estimates and attractiveness judgments covary with recall, the data are correlational and do not permit any strong causal inferences.

Tversky and Kahneman's hypothesis that subjects infer greater frequency for categories whose category instances are most accessible in memory has particular importance for understanding processes of stereotype formation. Those group members who are most salient will have a disproportionate impact on our impressions of the group. It is important to know, then, which factors influence the availability of an event in memory. One obvious and important determinant of accessibility in memory is extremity. Extreme individuals, by virtue of their being novel, infrequent, or particularly dramatic, should be more salient or available in memory and, if availability is a cue to frequency, overestimated when we judge their prevalence in a group.

Experiment 2

Previous research on the effects of extreme instances in impression

formation has demonstrated that highly evaluatively polarized events carry more weight in impression formation than do events that are less evaluatively polarized (Leon, Oden, & Anderson, 1973; Manis, Gleason, & Dawes, 1966). There is no evidence, however, that the frequency of extreme events is perceived to be greater than for equal numbers of mild events. Moreover, past research, by using stimulus materials that have clear evaluative significance, has confounded extremity with hedonic relevance.

Experiment 2 was designed to see whether subjects would estimate the frequency of individuals with extreme physical attributes to be greater than the frequency of equal numbers of individuals with less extreme physical attributes.

Overview of Method

Subjects were presented with the heights, in feet and inches, of each person in a group of fifty men. For all subjects, the frequency distribution for height had a mean of 5'10", and 20% of the group were over 6' in height; for half of the subjects who had been assigned to the mild condition the stimulus persons over six feet were only slightly over six feet (6'1" - 6'4"), while for the other subjects assigned to the extreme condition, the stimulus persons were considerably over six feet (6'5" - 6'11"). After being presented with the heights of 50 men in succession, subjects were asked to estimate the number (or proportion) of stimulus persons over six feet in height.

Results

In accord with the prediction, subjects in the extreme group gave significantly higher estimates of the number of stimulus persons over six

feet ($\bar{X}_{mild}$ = 10.53, $\bar{X}_{extreme}$ = 14.95; F = 13.12, df = 1/73, p < .001).

Experiment 3

A third experiment was conducted to determine whether we could obtain the same overestimation of extreme instances using social, rather than physical stimuli. Moreover, although the data from Experiment 2 are consistent with the availability hypothesis, it was not meaningful to obtain recall measures for the different heights to determine whether recall and frequency data covaried. In Experiment 3, it was possible to obtain both frequency estimates and recall data. Using a direct analogue of the previous experimental paradigm, subjects were presented with 50 statements each depicting a behavior engaged in by a different man. For all subjects forty of the statements depicted either mildly favorable, neutral, or mildly unfavorable behaviors. The remaining ten behaviors depicted an act considered by all pilot subjects to be criminal. The criminal acts shown to half the experimental subjects were relatively non-serious (shoplifting, vandalism, forgery, income tax evasion, and counterfeiting), while those shown to the other half were quite serious (murder, rape, child-molesting, kidnapping, and assault). After being presented with the series of 50 behaviors, subjects were asked to estimate the number of people who engaged in criminal acts, and to recall as many of the acts as they could.

Results

In accord with the prediction, estimates of the number of people who engaged in criminal activity were greater for the extreme than the mild condition ($\bar{X}_{mild}$ = 12.37, $\bar{X}_{extreme}$ = 15.43, F = 9.71, df = 1/153, p < .002). The recall data (coded by a rater ignorant of the hypothesis) also showed the

predicted effect ($\bar{X}_{mild}$ = 5.62, $\bar{X}_{extreme}$ = 6.43, F = 8.35, df = 1/153, $p < .01$).

Discussion

Experiments 2 and 3 strongly suggest that individuals with extreme characteristics are more memorable and, because of their availability in memory, are estimated as more frequent than corresponding numbers of "mild" individuals. More generally, these experiments indicate that our impressions of groups will be disproportionately influenced by the characteristics of their most memorable constituents. The last two experiments also may shed some light on the predominance of unfavorable group stereotypes. Kanouse and Hanson (1971) have suggested that since the most prevalent life outcomes are moderately favorable, favorable outcomes are comparatively less extreme than unfavorable outcomes (by virtue of favorable outcomes being closer to our normative experiences); thus, negative behaviors are more likely than positive behaviors to be over-represented in the stereotype.

Experiment 4

It is possible to ask, then, what factors other than extremity might influence availability in memory. One factor particularly relevant to the maintenance of already formed stereotypes is the availability of instances that confirm prior expectancies.

On the assumption that selective memory for confirming instances may provide a simple cognitive explanation for the ready perpetuation of social stereotypes, we designed an experiment to examine subjects' recall for instances consistent with (and inconsistent with) their original expectancies.

Subjects were given initial expectations about the general characteristics of a group. Following this, they were given behavioral information

about each of the group's constituent members that either confirmed the original expectancy, disconfirmed the expectancy (i.e., was opposite or contradictory to the expectancy), or was irrelevant to the expectancy (neither confirmed nor disconfirmed the expectancy).

There were two major predictions:

1. Subjects would show greater recall and higher frequency estimates for confirming instances than irrelevant instances (of equal frequency),
2. Subjects would show greater recall and higher frequency estimates for disconfirming instances than irrelevant instances (of equal frequency).

Method

Eighty-four undergraduates at the University of Oregon served as subjects, and were randomly assigned to one of two expectancy conditions. All subjects were told they would be presented with information depicting behaviors engaged in by each person in a group of men. One-half of the subjects were led to believe that the group was

> "more intellectual than average...they tend to be scholarly and oriented toward intellectual achievement..."

and the other subjects were led to believe the group was

> "more friendly and sociable than average...they tend to enjoy making new friends and meeting with old friends..."

In fact, all subjects were presented with the identical set of fifty behavioral instances. On the basis of extensive pretesting, fifty behavior statements had been selected to include 17 instances of unambiguously friendly behavior (e.g., "Jim invited friends to a potluck dinner at his home"), 17 instances of unambiguously intelligent behavior (e.g., "Frank was his class valedictorian"), 3 instances of unambiguously unfriendly behavior (e.g., "Joe

avoided introducing himself to a new neighbor"), 3 instances of unambiguously non-intelligent behavior (e.g., "Bill finished his junior and senior years close to the bottom of his class"), and 10 instances of behaviors perceived as unrelated to any of the previous four categories (e.g., "Ralph chopped some wood for the fireplace").

After presentation of the behavioral information, subjects were first asked to estimate how many behaviors were presented in each of the five categories (friendly, unfriendly, intelligent, unintelligent, unrelated), and were then asked to try to recall as many of the behaviors as they could in each category.

Finally, all subjects were given the entire list of 50 behaviors and asked to place each of them in the most appropriate of the five behavior categories. This final measure was obtained to determine whether a tendency for greater frequency judgments and recall for expected events was due to a change in the "criteria" for categorizing the behaviors. For example, the subjects who expected the group to be friendly might perceive more of the behaviors as belonging to the friendly category than to the intelligent category, and the subjects expecting an intelligent group might make the opposite shift. For simplicity, this will be referred to as the "recategorization" hypothesis.

Results

The Table below presents the frequency and recall data for confirming instances only.

It is apparent from this data that for both measures the people that expected friendly behaviors remembered more friendly behaviors, while the

SUBJECTS' EXPECTANCIES	TYPE OF BEHAVIOR: FRIENDLY	TYPE OF BEHAVIOR: INTELLIGENT
FRIENDLY	14.39 (5.82)	11.17 (6.70)
INTELLIGENT	11.71 (5.33)	14.08 (7.71)

ESTIMATED FREQUENCY

SUBJECTS' EXPECTANCIES	TYPE OF BEHAVIOR: FRIENDLY	TYPE OF BEHAVIOR: INTELLIGENT
FRIENDLY	4.74 (2.05)	4.02 (1.82)
INTELLIGENT	4.05 (2.16)	4.83 (2.27)

RECALL

people who expected intelligence remembered more intelligent behaviors. The interaction was significant for frequency estimates ($F = 14.75$, $df = 1/83$, $p < .001$) and for recall ($F = 10.38$, $df = 1/83$, $p < .002$).

The second hypothesis, that subjects would show greater frequency estimates and recall for disconfirming instances that were relevant to the stereotype (than control instances irrelevant to the stereotype), was not supported from the present data. Although the present data do not support this hypothesis, this may in part be due to the paucity of disconfirming instances (3 out of 50); increasing the number of disconfirming instances in future experiments would constitute a fairer test of the hypothesis.

An analysis of subjects' placements of the fifty behaviors in each of the five categories presents no evidence for the recategorization hypothesis.

The present data, then, provide strong evidence for selective memory of events that confirm prior expectancies or stereotypes.

In summary, I must first apologize for throwing so much data at the listener, but I feel there are two general messages of importance in this data. The first is that when people form impressions of groups from

information about individual group members, they are selective in the information that they learn, and selective in what they later retrieve from memory when they make judgments about the group. This may appear trivial, but it is an important point to consider when trying to answer the question "Are stereotypes accurate?". Inasmuch as summary judgments or stereotypes are selective, they will always ignore information, and by definition will be "inaccurate". The second point, of equal importance, is that the selectivity is not necessarily motivational in character, but simply is a way of dealing efficiently with large amounts of information. The same cognitive mechanisms that enable us to function more or less effectively in the physical world, by abstracting common properties from diverse stimuli, or by using simple heuristics to estimate quantity, are implicated as well in the formation and maintenance of beliefs about the attributes of human groups.